

ries are derived. Higher-order effects and limitations of the theory are also discussed.

The level of presentation throughout this volume is directed towards the diligent reader, not one who quickly wants to look up a formula. Those who wish to study and follow through the theory in detail, will find the necessary material presented here in a form worthy in every respect of the *Handbuch der Physik*.

Electricity and Magnetism. By Henry E. Duckworth. 424 pp. Holt, Rinehart and Winston, Inc., New York, 1960. \$8.00. Reviewed by D. Keefe, Lawrence Radiation Laboratory.

THOSE whose task it is to give lecture courses in electricity and magnetism will readily appreciate the problem of finding a suitable single textbook exactly to suit the needs of their students. Despite the many excellent texts available the objectives and scope of courses today are frequently so diverse that it is often hard to pick a book which matches the students' mathematical talents and still covers the desired material in the required detail. Professor Duckworth's book is in no sense intended as an attempt to provide a general solution to this problem but is designed to fill a particular and important gap in the elementary textbook literature. For an elementary course the inevitable millstone of poor mathematical knowledge might make this text seem to sacrifice simplicity for rigor. It is directed toward students at the intermediate level who need know nothing of electricity and magnetism but who have studied elementary physics and calculus (differential and integral) and have some knowledge of vector usage and differential equations.

For such students this is an excellent introduction to the subject and alone should serve to carry the reader from zero knowledge to the level of tackling advanced texts such as Jeans. The writing is economical but the development is as full as could be desired and the author has succeeded in keeping a high standard of rigor and logic. Many of the time-consuming and qualitative discussions of older texts—particularly on electro- and magnetostatics—have been abbreviated substantially. As is essential in a book which is to appeal to engineering as well as science students the mks system of units is given priority. The cgs and cgs-m systems of units, although given second-class status, are explained adequately in every necessary context. Incidentally, the present text begins traditionally by devoting the opening 65 pages to electric forces, fields and potential, unlike a certain recent text committed to the mks system which gave a very contracted version of electrostatics only after the definition of current had been explained rather late in the book.

Apart from the standard material including direct and alternating currents, electromagnetic induction, magnetic properties of matter, and electrical instruments, there are excellent chapters on dielectric theory and behavior, resistance (including nonohmic resistance devices), and thermoelectricity. Electrolysis, batteries,

and cells are referred to only briefly. There are frequent digressions into the field of modern physics, usually to explain the fundamental laws responsible for the macroscopic electrical or magnetic phenomena under consideration, or to refer to recent applications of certain effects.

What may be one of the most attractive features to many is the list of almost three hundred problems graded: "Hard", "Medium", "Easy", distributed among the fourteen chapters. These are well conceived and are designed to give plenty of practice in fairly straightforward mathematical manipulations.

Plasma Physics: A Course Given by S. Chandrasekhar. Notes Compiled by S. K. Trehan. 217 pp. The U. of Chicago Press, Chicago, Ill., 1960. Paperbound \$1.75. Reviewed by George Weiss, Institute for Fluid Dynamics and Applied Mathematics, University of Maryland.

ALTHOUGH this account of plasma physics presents the theory mainly along the lines developed by Chandrasekhar and Rosenbluth, it is nevertheless a valuable addition to the physicist's bookshelf. A rough outline of the contents includes the derivations of basic equations, the theory of charged particle orbits in an electromagnetic field, adiabatic invariants, the theory of the pinch, an introduction to stability against perturbations, dispersion formulas, and transport phenomena. These notes lack a detailed examination of nonlinear effects and present little of the molecular theory due to Bohm and Pines. Nevertheless it is as good an introduction to recent theoretical research in plasmas as can be gotten at this time.

Physics and Electronics in Physical Medicine. By A. Nightingale. 292 pp. The MacMillan Co., New York, 1959. \$6.00. Reviewed by R. Bruce Lindsay, Brown University.

THE modern advances in physical medicine with their reliance on more and more elaborate physical apparatus have introduced complications into medical education. By the time they finish medical school and start practice most physicians have pretty thoroughly forgotten the course in general physics taken as part of the premedical training. Those who decide to specialize in physiotherapy and physical medicine need a review and it obviously has to be of more specific nature than general physics. It is to meet this need that the present volume was written by the senior lecturer at St. Thomas's Hospital Medical School in London. It is based on a course which he has long given to post-graduate physicians preparing for the Diploma in Physical Medicine of the Royal College of Physicians and Surgeons.

The first half of the book is a brief review of elementary physics with special emphasis on those aspects of particular application to medical practice. This is well written with many well-conceived diagrams and

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a minimum of mathematics. Illustrations are mainly chosen from the physics of the human body and are clearly explained. A considerable amount of attention is also paid to electronics and related devices useful in physical medicine.

The second half deals specifically with applications including the physiological effects of electricity and its use for stimulating and heating the body, diathermy, the biological effects of electromagnetic radiation, electromyography (measurement of body potentials), and ultrasonic therapy. The last named topic is given a very brief and cursory treatment, with no mention of the recently developed diagnostic uses of ultrasonics. There is curiously enough no discussion of x rays or of radiation by radioactive materials. These omissions render the book less valuable than it otherwise might be.

Introduction to Quantum Field Theory. By F. Mandl. 202 pp. Interscience Publishers, Inc., New York, 1959. \$6.00. *Reviewed by H. Mendlowitz, National Bureau of Standards.*

IN writing a textbook, especially an introductory text, two of the most important problems confronting an author are the choice of topics and their treatment. In my opinion the author has chosen his topics very judiciously and wisely. He tried to give the uninitiated a good foundation in field theory and avoided for the most part the finer points and newer problems in field theoretic investigations. In about one hundred and sixty pages, the author has twenty-two chapters, each dealing with a different subject. These include such topics as the Gupta-Bleuler formalism for photons, S-matrix, Feynman graphs, radiative corrections, self-energy, vacuum polarization, and renormalization. An additional thirty-five pages are devoted to exercises and hints for their solutions as well as an appendix on Dirac theory. If one were to master the ground covered in this book, he would have a good grasp of basic field theory including the great advances which were made up to the early fifties. I feel that the omission of a treatment of dispersion relations, special models, and similar current topics does not detract from the book in any way because they are outside the limited scope of this text.

Although I agree with the author that great bulk and a large number of pages do not necessarily make a good text, one can also err in the opposite direction. The one major criticism that I have is that the book is not self-contained. It is necessary to go elsewhere to complete the topics chosen by the author. For instance, in the case of the Wick T -product, the author states: "For the case of 'unequal times' . . . Wick proves the following . . .," and lists the reference to Wick's paper. The last few chapters which include such topics as vacuum polarization, vertex modification, anomalous moment of the electron, and renormalization are treated almost in the barest outline form; and in order to really understand the "solutions" to these problems, I feel that one must get aid elsewhere. An increase in the size